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LA-UR-20-30094
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Title: General Nuclide Identification with PeakEasy

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Intended for: DHS Spectroscopic Alarm Adjudication Pilot Course

Issued: 2020-12-09

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General Nuclide Identification with PeakEasy

Spectroscopic Alarm Adjudication Course

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Homeland Security

LA-UR-20-XXXXX

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Objective

List the basic steps of doing nuclide identification

- Use pattern recognition
- Check energy calibration
- Compare the “unknown” spectrum to a background spectrum
- Use energy search method
- Specifically look for SNM
- Use PeakEasy Library Spectra
- Be able to explain everything in the spectrum

Problem Statement

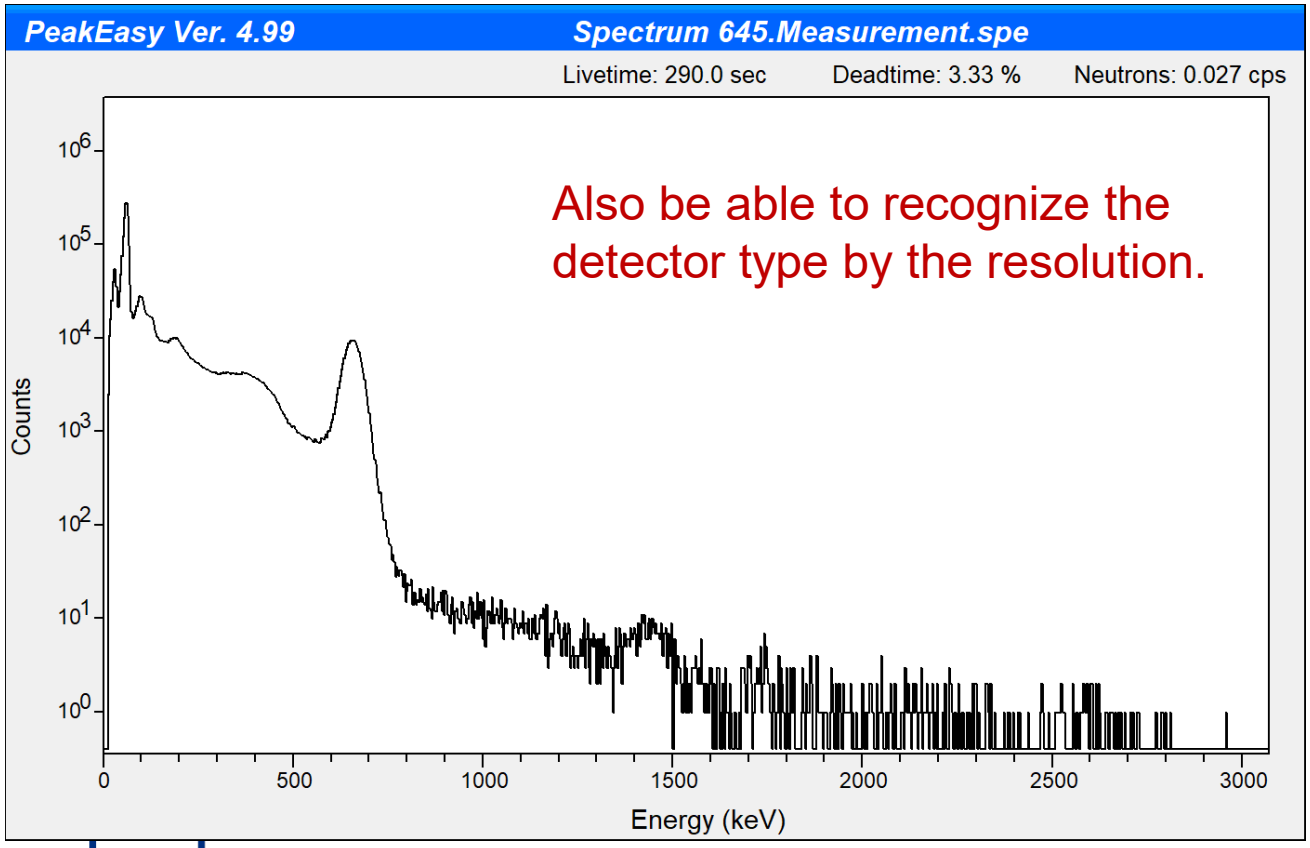
You are given the following spectra:

- Item of Primary Concern (IPC)
- Background (BG)

- Conduct Nuclide Identification

Pattern Recognition

If you have experience in recognizing gamma-ray spectral patterns, look at the IPC spectrum first.



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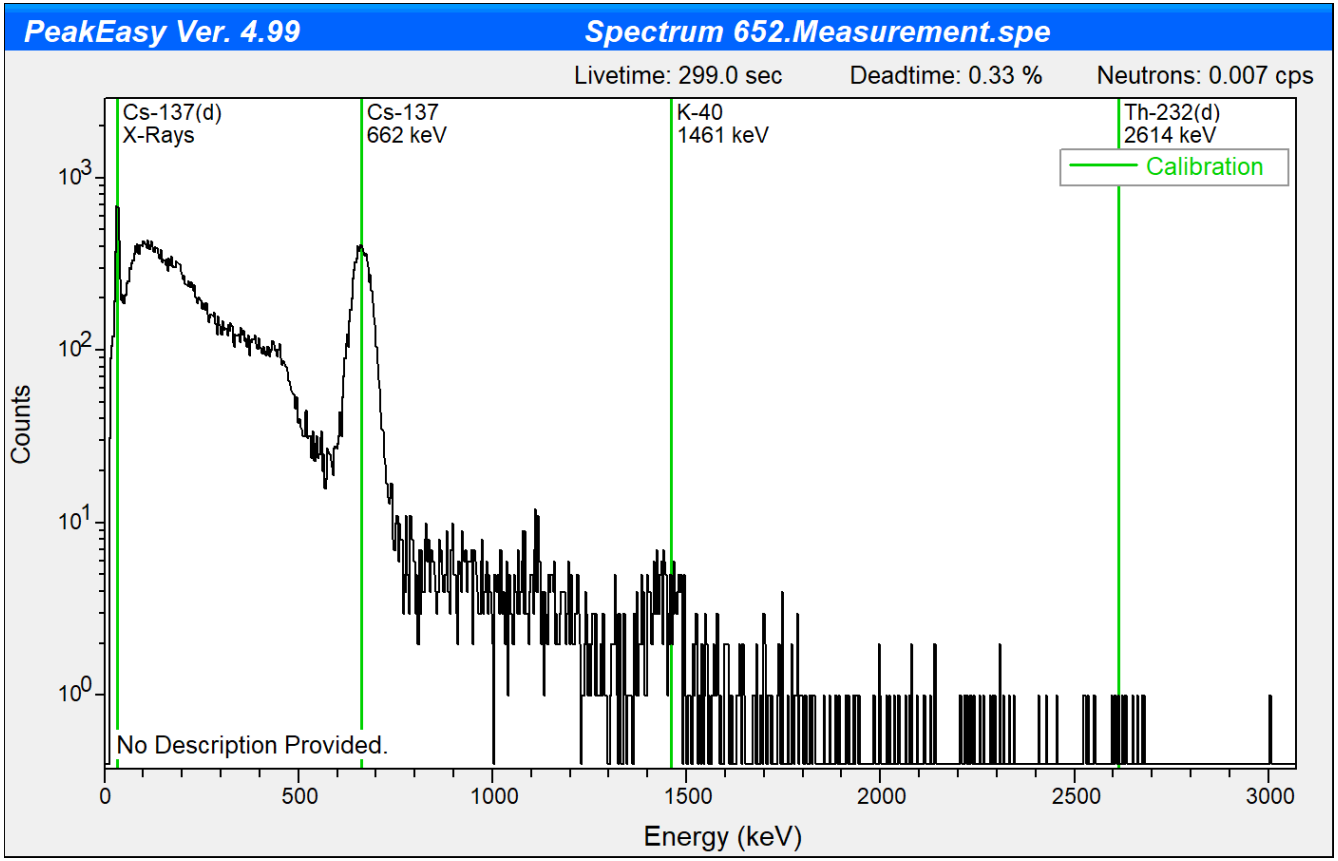
Check Energy Calibration

You may be able to use the background and internal seed signature to check energy calibration.

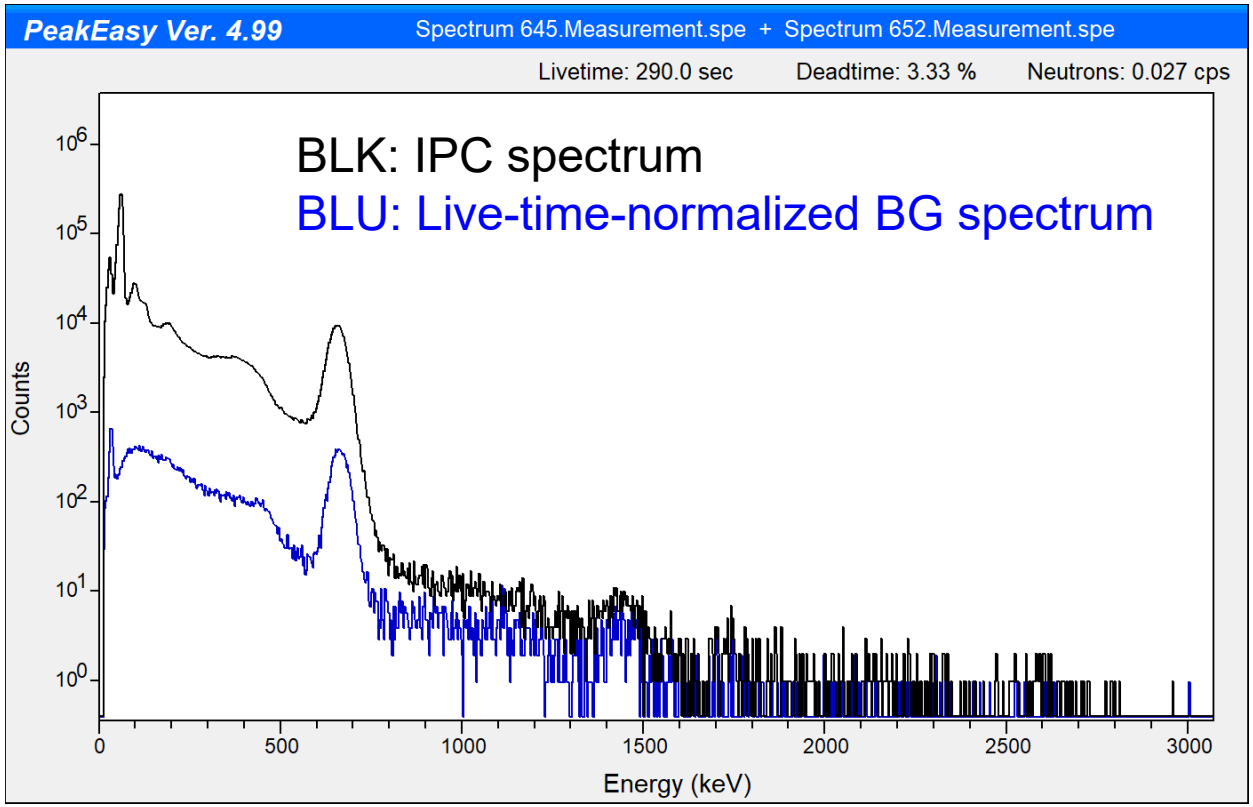


QUESTION

- For the spectrum on the previous slide, name two things you should do to check the calibration for the Cs X-ray(s) energy?
  - HINT: One thing has already been done on the previous slide

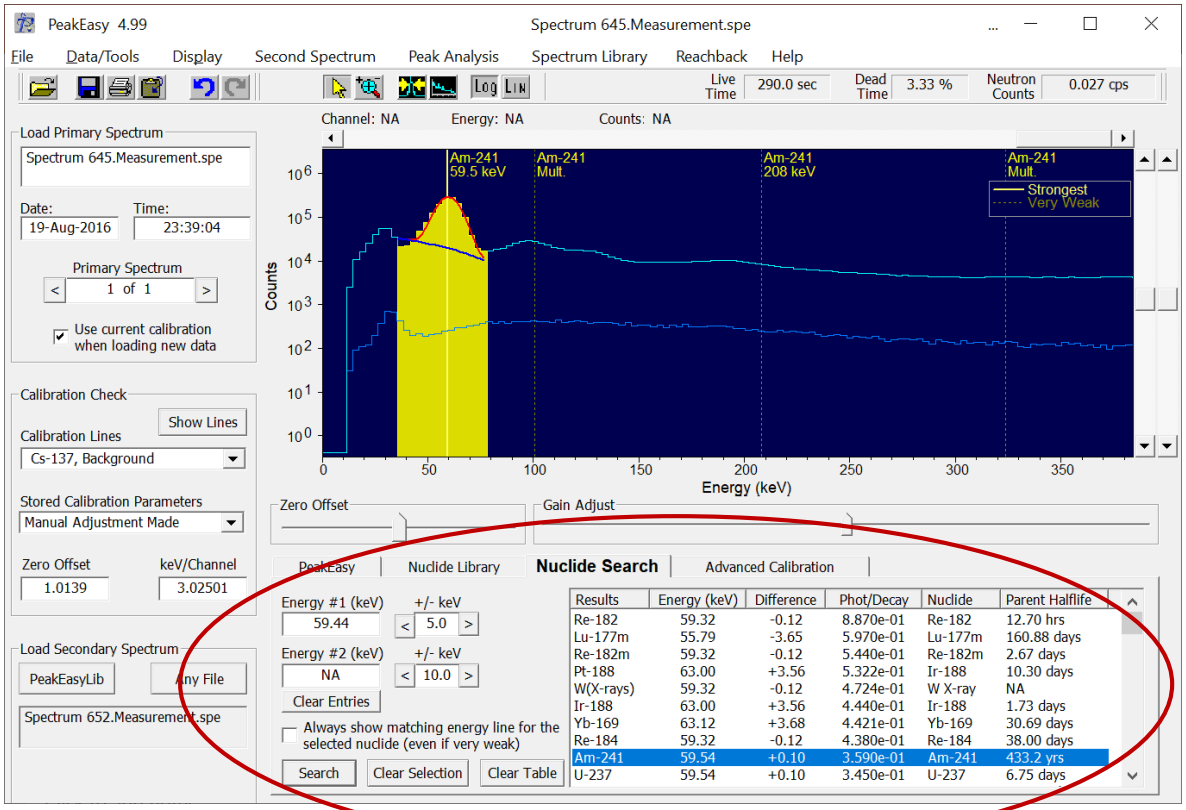
Compare IPC with Background

Normalize the background by live time and look for those features in the IPC spectrum that do not appear in the background.



Search on Peak Energies

You can search on peak energies with a resolution-appropriate tolerance.



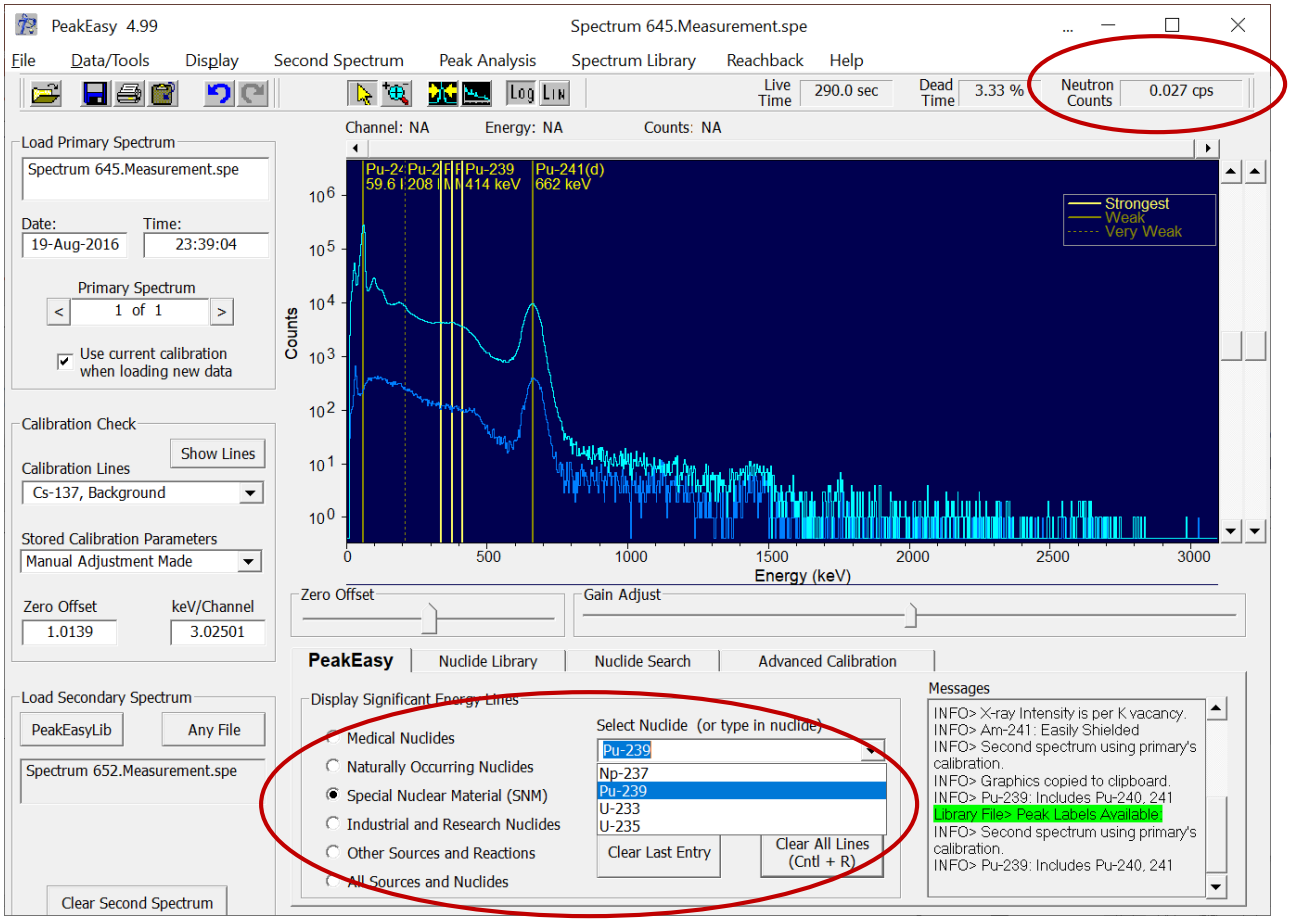
QUESTION

- Give an example where searching on two peak energies simultaneously can lead to a poor ID candidate.

Specifically Look for SNM

Even if you think you know what it is, look for SNM!

- **Direct SNM Gammas**
- **Neutron rate above BG**
- **(n,γ) & (n,n',γ) Lines**
- **Counts above 2614**



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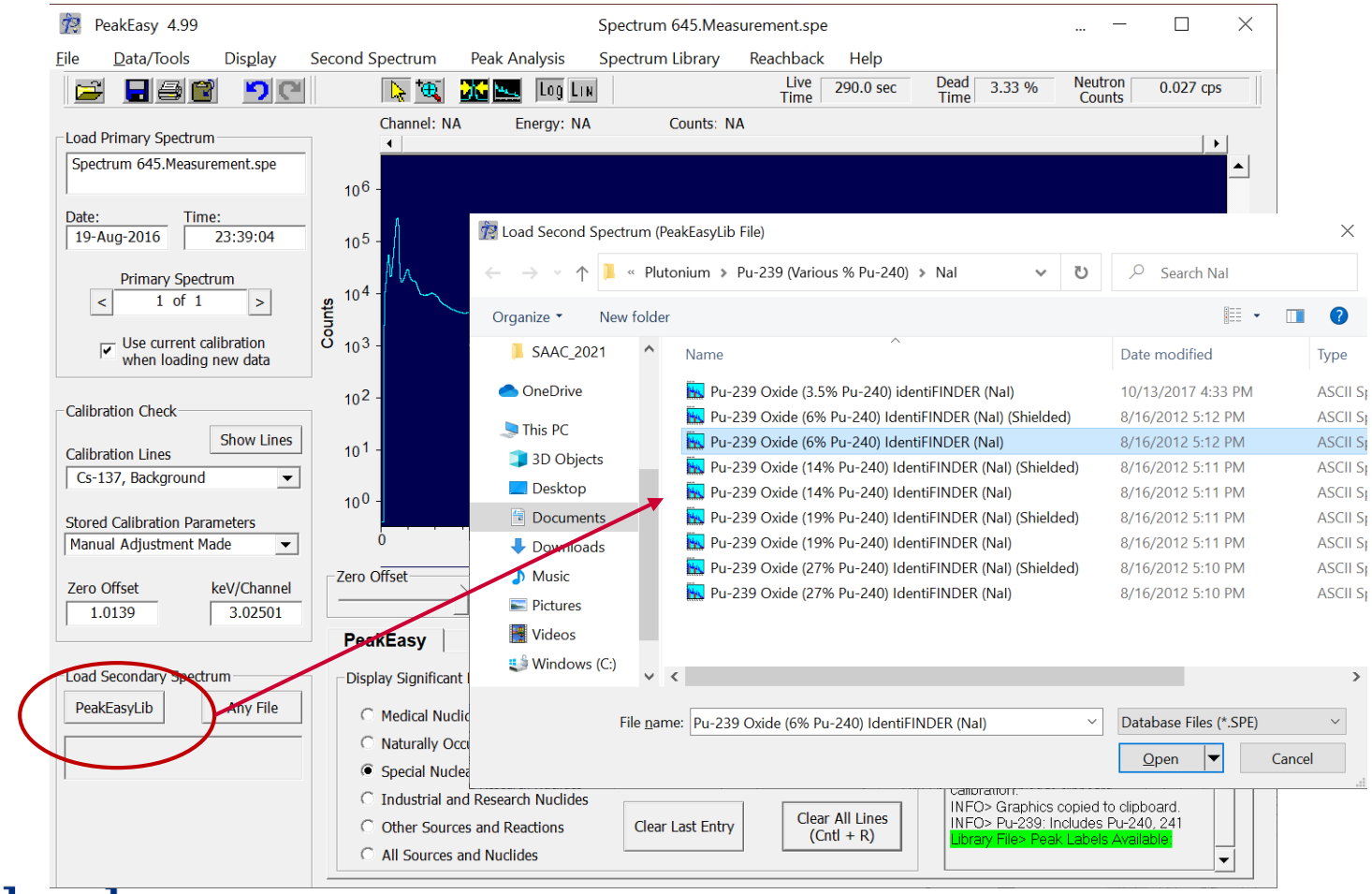
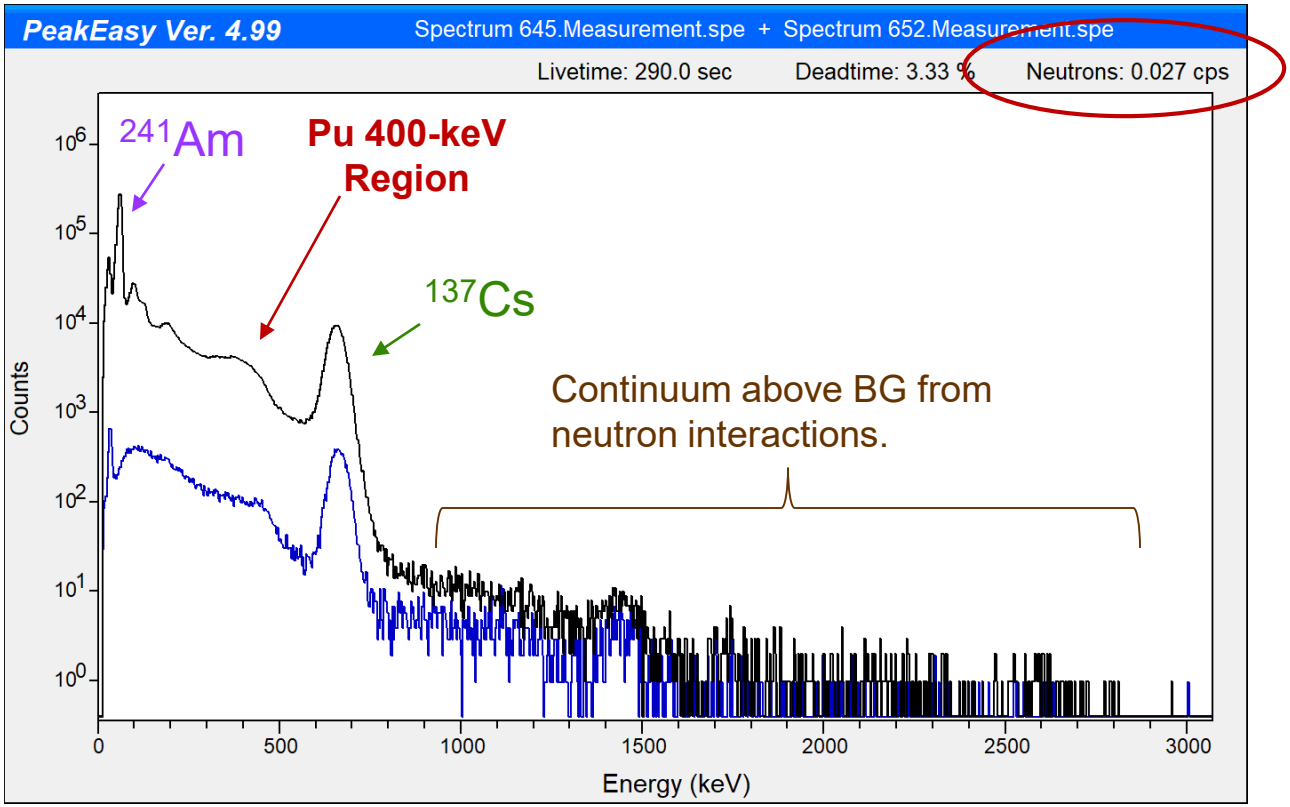
PeakEasy Library Spectra

Use PeakEasy Library spectra to help with identification



Explain Everything in the Spectrum

You are not finished until you can explain everything in the spectrum.



QUESTION

- Why should you **not** normalize by live time when comparing PeakEasy library spectra to your IPC?

Summary

- Pattern recognition can help you with ID and calibration
- Search on energies only after you have calibrated
- You can use the background to calibrate
- Compare the “unknown” IPC spectrum to a background spectrum
- Specifically look for SNM - always – ZOOM IN!
- You are not done until you can explain everything in the spectrum